Uncovering the chitin degradation and utilization potential of marine microbiomes

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Abstract

Chitin is one of the most abundant sugars in the ocean. However, little is known about how the structure and diversity of chitin-degrading microbial communities vary across marine niches. Scientists have now shed light on the chitin processing potential within the microbiomes of marine sponges, octocorals, sediments, and seawater. Multiple cultivable genera were found to be able to degrade colloidal chitin in vitro. Genome analysis found that some non-cultivable species had genes needed to break down chitin, while other species had genes needed to utilize the chitin monomer N-acetylglucosamine. The researchers then analyzed the abundance of chitin-metabolism-related genes across 30 sequenced microbial metagenomes, and found data suggesting the ability of a marine sponge microbiome to convert chitin to its more biotechnologically versatile form - chitosan. These findings suggest that chitin is processed through multiple mechanisms across marine micro-niches and support the hypothesis that inter-species cross-feeding could facilitate the co-existence of chitin utilizers within marine invertebrate microbiomes.